

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method of driving an electromagnetic pump that ~~conveys~~
the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger including a permanent magnet inside the cylinder; and

passing a current through an aircore electromagnetic coil fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder; and

wherein alternately applying a pulse voltage ~~is applied alternately~~ on a positive side and a negative side to drive the electromagnetic coil such that a change in voltage that occurs when the polarity of the pulse voltage is inverted has a linearly or exponentially continuous slope at least between the positive side and the negative side.

2. (Currently Amended) A—The method of driving an electromagnetic pump according to Claim 1, wherein the applying step comprises applying a sinewave-shaped pulse voltage is applied, whose peaks are substantially flat, to drive the electromagnetic coil.

3. (Currently Amended) A—The method of driving an electromagnetic pump according to Claim 1, wherein the applying step comprises applying a driving voltage $V(t)$ is applied in a range provided by Equation (1) below where a maximum value of the driving voltage $V(t)$ applied to the electromagnetic coil is set at V_{max}

$$0.8 \cdot V_{max} \cdot \sin(\omega t) < V(t) < 1.5 \cdot V_{max} \cdot \sin(\omega t) \dots \text{Equation (1)}$$

(where t : time and ω : angular velocity).

4. (Currently Amended) A method of driving an electromagnetic pump that conveys
, the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger
including a permanent magnet inside the cylinder; and

passing a current through an aircore electromagnetic coil fitted around the cylinder to
reciprocally move the plunger in the axial direction inside the cylinder; and

wherein detecting the current flowing through the electromagnetic coil is detected and ;
and

flowing a pulse current flows where a change in current that occurs when the polarity of
the current is inverted has a linearly or exponentially continuous slope at least between the
positive side and the negative side.

5. (Currently Amended) A—The method of driving an electromagnetic pump
according to Claim 4, wherein further comprising:

controlling the current is controlled so that a sinewave-shaped pulse current, whose peaks
are substantially flat, flows in the electromagnetic coil.

6. (Currently Amended) A—The method of driving an electromagnetic pump
according to Claim 4, wherein further comprising:

controlling a driving current $I(t)$ is controlled in a range provided by Equation (2) below where a maximum value of the driving current $I(t)$ that flows in the electromagnetic coil is set at I_{max}

$$0.8 \cdot I_{max} \cdot \sin(\omega t) < I(t) < 1.5 \cdot I_{max} \cdot \sin(\omega t) \dots \text{Equation (2)}$$

(where t : time and ω : angular velocity).

7. (Currently Amended) A method of driving an electromagnetic pump that ~~conveys~~,
the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger including a permanent magnet inside the cylinder; and;

passing a current through an aircore electromagnetic coil fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder; and

wherein applying a pulse voltage is applied or flowing a pulse current flows including a period where a voltage or current value is zero when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted[.].

wherein the pulse voltage or the pulse current flows so that a minute voltage pulse of at least 30% of a maximum voltage is applied or a minute current pulse at least 30% of a maximum current flows before the period where the voltage or current value is zero.

8. (Canceled)

9. (Currently Amended) A method of driving an electromagnetic pump that conveys, the method comprising:

conveying a fluid from a pump chamber formed inside a cylinder by housing a plunger including a permanent magnet inside the cylinder ~~and;~~

passing a current through an aircore electromagnetic coil fitted around the cylinder to reciprocally move the plunger in the axial direction inside the cylinder~~[,]~~; and

wherein applying a pulse voltage is applied or flowing a pulse current flows so that an offset voltage of no greater than 30% of a maximum voltage is applied or an offset current of no greater than 30% of a maximum current flows when the polarity of a driving voltage or a supplied current of the electromagnetic coil is inverted.

10. (Currently Amended) ~~A-~~The method of driving an electromagnetic pump according to Claim 9, wherein the pulse voltage is applied or the pulse current flows so that before a period where the offset voltage is applied or the offset current flows, a minute voltage pulse of at least 30% of the maximum voltage is applied or a minute current pulse of at least 30% of the maximum current flows.